Third United Nations International Conference on the Peaceful Uses of Atomic Energy

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Abstract

COMMERCIAL PRODUCTION OF STABLE ISOTOPES

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The basic experimental data and general technological scheme of the plant's performance are given in the report.

In the first place production of boron and nitrogen isotopes B^{10}, B^{11} and N^{15} was organized.

Two methods are used to produce boron isotopes: low-temperature distillation of boron trifluoride and exchange distillation of its methyl ether complex. Schemes and parameters of columns to produce 25 kg/year of boron-10 are given.

The nitric oxide - nitric acid exchange process is used to separate nitrogen isotopes. Schemes and parameters of columns to produce 4,5 kg/year of nitrogen-15 are given.

System of automatic control is described, which includes a number of special sensing elements, actuating mechanisms and regulators.

In the second place production of isotopes O^{18} and N^{15} will be envisaged by low-temperature distillation of nitric oxide and isotopes Ne^{22}, Ar^{36}, C^{13}, Kr^{86} by diffusion through another gas.

The results of calculations and experimental data are given.

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Abstract

RADIATION THERMAL CRACKING (RTC) OF OIL, OIL PRODUCTS AND GASEOUS HYDROCARBONS

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The use of radiations (γ, e^-, γ - n) permits to accomplish liquid and gaseous hydrocarbon pyrolisis in the vapor phase, because the radiation eliminates the activation limit of process initiation and the temperature (which is some 200°C lower than that of common cracking processes) provides conditions for primary radical decomposition and the chain reaction development.

It is shown, that the common radiolysis of hydrocarbons becomes of value at near 250°C and when the catalysis provided in the reaction volume near 150°C.

The RTC objective is to obtain unlimited monomeric raw materials for oil chemical synthesis and polymerisation.

The RTC of various types of raw oil, oil fractions and gaseous hydrocarbons was studied.

The dependences of the desired products yield and raw materials conversion depth on dose rate, time of presence in the reaction zone on temperature and pressure were studied for establishing the optimal conditions of the RTC process.

It is shown, that the unlimited gas yield reaches upto almost 55 per cent in the raw materials, and their content in the RTC gases

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is approximating 70 per cent; the content of liquid unlimited components in the condensate is near 45 weight per cent. The total conversion depth during a single run equals almost 75 per cent. The radiation chemical yield comprises approximately 10^3 - 10^5 molecules per 100 ev depending on rate temperature and pressure. The RTC optimal conditions as to the yields and conversion depth for various raw materials range from 400 to 600°C at 1-3 atm depending on the dose rate.

The preliminary estimations show the economical efficiency of RTC in comparison with the pyrolisis in tube furnaces.